

Effects of BIS/BAS on achievement goal orientations

University of Helsinki
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General and Adult Education
Master's Thesis
April 2014
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Introduction.....	1
2. BIS/BAS.....	3
2.1. Divisions of BIS/BAS.....	5
2.2. The BIS/BAS Scales.....	5
2.3. BIS/BAS in previous research.....	7
2.4. BIS/BAS in this study.....	9
3. Achievement goal orientations.....	9
3.1. Conceptualizations and divisions of achievement goals.....	9
3.2. Achievement goal orientations.....	13
3.3. Effects of BIS/BAS on achievement goals in previous research.....	16
4. The research hypothesis and task.....	18
5. Method.....	18
6. Results.....	20
6.1. Preliminary analyses.....	20
6.2. Correlations.....	26
6.3. Regression analyses.....	28
6.4. The MSRP instrument.....	28
7. Discussion.....	29
7.1. Effects of BIS/BAS on achievement goal orientations.....	30
7.2. Evaluation of the MSRP instrument.....	33
7.3. Limitations of this study and suggestions for future research.....	36
8. Conclusions.....	38
References.....	40

Introduction

The purpose of this study is to investigate the relationship between temperamental differences and motivation in an achievement situation. In studying motivation, the question of why students adopt or aim for given goals is central (Dweck, 1986; Urdan, 1997). This issue has been addressed from various standpoints within motivational research. In this study, the focus is on how inherent, temperamental differences affect the motivational goal orientations of students in the school context.

The Behavioural Inhibition System/Behavioural Approach System (BIS/BAS) is a theoretical construct describing an approach and avoidance system of biologically-based personality factors, which are seen as accounting for both behavioural differences between individuals, and behavioural patterns of individuals that remain fairly consistent across time and situations (Corr, 2008; Elliot & Thrash 2002; McNaughton & Corr, 2008). The BIS/BAS system regulates tendencies to react to affective events and stimuli from the environment in a characteristic way. These affective events can in very generalised lines be divided into two classes: the positive and the negative, the appetitive rewards and the aversive punishments (McNaughton & Corr, 2008).

BIS is commonly defined as a self-protective function against painful experiences resulting from undesirable outcomes of activity (Carver & White, 1994; Corr, 2008; Corr & McNaughton, 2008; Elliot & Thrash, 2002). It is seen as regulating a person's sensitivity to perceive signals associated with frustrating and non-rewarding experiences and the threat of punishment, and a tendency to have an anxious, avoidance-oriented reaction to new situations and people. Conversely, the BAS construct describes an individual's sensitivity to react to rewards, both actual and anticipated, lack of punishment, and the positive signals associated with these. It is seen as being linked with impulsivity, extraversion, and positive affect (Carver & White, 1994; Coplan, Wilson, Frohlick & Zelenski, 2006; Corr, 2008; Elliot & Thrash, 2002), and as related to the active pursuit of rewards, goals and desired ends (e.g., Bjørnebekk, 2007).

As a concept in educational research, goals have been defined both as task-specific performance standards aimed for, and as a more general purpose for taking up a given activity (Harackiewicz & Sansone, 1991). According to Urdan (1997), for achievement goal research, the question of why an individual aims to achieve something is more central than the question of what they are aiming to achieve. Achievement goals have been seen as reflecting the purposes of engaging in achievement-related behaviour, i.e. behaviour aimed at developing ability and competence and demonstrating it, and avoiding demonstrating a lack of ability (Nicholls, 1984). According to Niemivirta (2002), there is a conceptual distinction between achievement goals as objects, events or experiences desired and sought, and achievement goal orientations as generalised attitudes towards school-related learning, which remain fairly stable over time and across situations.

The potential effects and links of individual differences and temperamental tendencies on goal adoption have long been recognised (Ames & Archer, 1988; Elliot and Thrash, 2002; Harackiewicz and Sansone, 1991; see also Urdan & Schoenfelder, 2006). It has been suggested that goal orientations reflect a motivational mindset brought into the learning and performance situation by the students, rather than one adopted by them (Tapola & Niemivirta, 2008). Tapola and Niemivirta (2008) found students' predispositions and the actuality of classroom situations to have a reciprocal nature; the students' perceptions and experiences of apparently identical classroom situations were filtered through their motivational mindsets. It follows that classroom and teaching practices, and changes and developments in them, may feel positive to some students, but for others represent further sources of anxiety and fear of failure, in accordance with, for instance, their dispositional reactions to novelty (Tapola, 2013). The experiences of fear, anxiety, and other aversive and avoidance-inducing emotional states are the same among individuals, and universally shared. However, there is a difference between individuals in what elicits these emotional states, how "easily" they are triggered, and how an individual typically reacts in situations in which the emotional state is activated (Corr, 2008). The importance of understanding the individuality of students' needs is evident.

In recent years, there has been a growing body of research attending to this issue and examining the connections between the dispositional BIS/BAS factors and achievement

goals (Bjørnebekk, 2007, 2009; Bjørnebekk & Diseth, 2010; Elliot & McGregor, 2001; Elliot & Thrash, 2002; Tanaka & Yamauchi, 2004; Thrash & Elliot, 2001). The present study will also address this question. However, unlike previous research, this study will focus on the effects BIS/BAS exerts on the achievement goal orientations as defined by Niemivirta (2002). Also, an exploratory instrument for measuring BIS/BAS, developed by Niemivirta (2007), which has not been used before in published research, will be utilized.

2. BIS/BAS

The BIS/BAS conceptualization is much utilised in empirical studies within the fields of psychology and educational psychology (Bjørnebekk 2007, 2009; Bjørnebekk & Diseth, 2010; Blair, Peters & Granger, 2004; Carver & White, 1994; Colder, Trucco, Lopez, Hawk Jr., Read, Lengua, Weiczorek & Eiden, 2011; Elliot & Thrash, 2002; Heym, Ferguson & Lawrence, 2008; Kingsbury, Coplan, Weeks & Rose-Krasnor, 2013; Tanaka & Yamauchi, 2004). Another core construct of describing inherent, dispositional differences is the division into approach and avoidance temperaments. Elliot and Thrash (2002) define the approach temperament as a neurobiologically based sensitivity and predisposition to perceive as well as have an affective and behavioural reaction to imagined, anticipated, and actual reward stimuli in the environment. The avoidance temperament, conversely, accounts for the sensitivity and predisposition to perceive the undesirable, negative stimuli related to punishment, and the proclivity to react accordingly both affectively and behaviourally (see also Thrash & Elliot, 2001; Elliot & McGregor, 2001; Elliot & Murayama, 2008). The approach temperament is seen as linked with extraversion, positive emotionality, and BAS, and the avoidance temperament, conversely, with introversion, negative emotionality, and BIS.

In today's research, both the Gray and McNaughton Reinforcement Sensitivity Theory (RST, see Corr, 2008, for an overview) and the approach-avoidance temperament division as conceptualised by Elliot and Thrash (2002) are considered as forming the theoretical framework for the BIS/BAS division. The RST focuses on BIS/BAS, whereas Elliot and Thrash describe the approach-avoidance temperament division as encompassing a broader range of neurobiological sensitivities, which include BIS/BAS but are not limited to it.

A clear difference between the approach-avoidance construct and the RST BIS/BAS theorizing is their way of defining the division of sensitivities to reward and punishment between the respective fundamental constructs of the two theories. According to the approach–avoidance division, the approach temperament is seen as sensitivity to reward per se, without a distinction made between received or denied rewards, and the avoidance temperament as sensitivity to punishment stimuli in a corresponding way (Elliot & Thrash, 2002). The RST view of BIS/BAS theorizing presents sensitivity to reward and non-punishment, on the one hand, and to punishment and non-reward on the other, as governed by different dispositional systems, i.e., BAS and BIS, respectively (Corr & McNaughton, 2008). In other words, the RST view sees also the absence of an expected negative event as a reward, and the absence of an expected positive event (or reward) as a punishment. Individuals who are highly BAS-sensitive are considered more prone to experience the lack of reward as punishment, and that this detection of non-reward would activate the BIS, creating an aversive state.

Within the RST view, the BIS/BAS system can be studied both as a state, or the working of neural systems, with the research focus on shorter-term emotions and behaviours, and as a trait, or longer-term dispositions of experiencing and exhibiting typical emotions and behaviours in similar situations. The so-called joint subsystems hypothesis postulates that whilst the BIS and the BAS can be seen as neurally independent (the separable subsystems hypothesis), they will interact when activated simultaneously (Corr, 2002; Corr & McNaughton, 2008). The concurrent activation of the two systems and the interaction that follows is likely to produce a variety of effects on both emotions and behaviour as well as on motivation (see Smillie, Pickering & Jackson, 2006). This view appears supported also by, for example, Kingsbury et al. (2013), as well as the findings of Heym et al. (2008), which highlight the relationships between various aspects of BIS and BAS in individuals. According to Corr and McNaughton (2008), the experimental prediction is that individuals high in both BIS and BAS would be more prone to an intense experiencing of an aversive state, whereas the state would be less powerful for individuals low in both (see also Coplan et al., 2006; Torrubia, César, Moltó & Caseras, 2001).

2.1. Divisions of BIS/BAS

The divisions and definitions used in BIS/BAS research are not straightforward or unified (see Corr, 2008). With some exceptions (e.g., Heym et al., 2008), research based on RST has to date mostly focused on the BIS and the BAS systems (e.g., Coplan et al., 2006; Muris, Meesters, de Kanter & Timmerman, 2005). However, RST divides the construct into three systems; in its original form, it separated from BIS a Fight-Flight System (FFS), thereby also separating fear (governed by FFS) and anxiety (BIS) as affective responses and systems to be studied. The revised RST developed the FFS concept further into the Fight-Flight-Freeze System (FFFS) (Corr, 2008; McNaughton & Corr, 2008). With this revision, BIS is defined as the system activated through a conflict between approach and avoidance responses to stimuli, necessitating a choice of action, and FFFS as the actual avoidance system. Choice is, in itself, a kind of a conflict, and so experienced as a source of anxiety. BIS would, once activated by conflict, direct the individual's attention to the source of the anxiety-inducing stimuli, assess risks and instigate caution, and finally engage either FFFS or BAS behaviour (Corr, 2002; McNaughton & Corr, 2008; Smillie et al., 2006). However, Knyazev, Slobodskaya and Wilson (2004) question the idea of fight/flight as belonging to the same, united FFFS construct. Rather, they suggest that fight (aggression) belongs to behavioural activation, and flight, conversely, to behavioural inhibition.

According to some researchers, measurements and research in which BIS is not separated from FFFS may produce skewed results and/or conclusions (e.g., Bjørnebekk 2007, 2009; Colder et al., 2011). Considering BIS (anxiety) to control also fear caused by perceived threats in the environment will result in misunderstanding the system, and thereby obstruct the formation of a true and clear theoretical model of it. Therefore, for example Colder et al. (2011) call for the creation of a BIS/BAS instrument that takes FFFS into account.

2.2. The BIS/BAS Scales

In the Behavioural Inhibition System/Behavioural Activation System Scales (BIS/BAS Scales), created by Carver and White (1994), a division of BAS into three constructs is suggested: Reward Responsiveness, Fun-Seeking and Drive (hereafter BAS RR, BAS FS and BAS D, respectively). In this division, BAS RR describes the positive responses to actual or anticipated rewards, BAS FS the tendency to desire new rewards and to

move towards potential rewards in an impulsive, spur-of-the-moment way, and BAS D as persistency in pursuing desired goals. The scales comprise of a Likert-type questionnaire, with a range from 1 (very true for me) to 4 (not at all true for me), and include seven questions measuring BIS, five questions for BAS RR, and four each for BAS FS and BAS D. Heym et al. (2008) give a succinct definition of these three subdivisions as BAS RR being related to motivation spurred by an anticipated future reward, BAS FS to motivation to aim for an immediate reward, and BAS D to goal-directed behaviour more generally.

To date, the BIS/BAS Scales remain by far the most utilised in BIS/BAS research (Levinson, Rodebaugh & Frye, 2011). The validity of the three-fold division of BAS has also been questioned, based both on theoretical and empirical considerations. Corr & McNaughton (2008) state that the BIS/BAS Scales are more appropriate for measuring a more general punishment sensitivity. It has been suggested that the BAS subcategories lack a clear theoretical basis in RST, and that they neither cover nor describe BAS behaviour with accuracy (Corr, 2008; Torrubia, Ávila and Caseras, 2008; Torrubia et al., 2001). Some researchers have failed to find empirical evidence to support the division, especially within research focusing on children and youths, and have considered BAS as one, undivided factor (Bjørnebekk & Diseth, 2010; Blair et al., 2004; Muris et al., 2005).

However, there is also empirical evidence for the suitability of a four-factor model for measuring BIS/BAS tendencies (e.g., Kingsbury et al., 2013), also in research with children and adolescents (e.g., Cooper, Gomez & Aucote, 2007). Heym et al. (2008) observed a five-fold division of BIS/Anxiety and FFFS, as well as the subdivisions of BAS into RR, D and FS, using the BIS/BAS Scales. They assert that their results show that the scales distinguish between BIS and FFFS, and that this validates the use of the original scales also in a model where BIS and FFFS are considered as separate factors. However, Heym et al. also call for revision of the scales in the light of more recent research, with added BIS and FFFS items, to enable covering different aspects of the separated factors better, and emphasise incorporating the revised RST into the theoretical considerations of future research.

Over the years after the BIS/BAS Scales were formulated, much research has been conducted to both test and verify the instrument (e.g., Cooper et al., 2007; Leone, Perugini, Bagozzi, Pierro & Mannetti, 2001) and question and inspect its factor structure and validity (e.g., Cogswell, Alloy, van Dulmen & Fresco, 2006; Jorm, Christensen, Henderson, Jacomb, Korten & Rodgers, 1997; Knyazev et al., 2004; Levinson et al., 2011). During the 2000s, studies have also been carried out that support the validity of the scale on the one hand, but point out its shortcomings on the other (Kingsbury et al., 2013), or validate the scales but emphasise the need to take into account more recent research in interpreting the results (Heym et al., 2008). In spite of the disagreements, the scales have been deemed valid for use as a measuring device of BIS/BAS by many (e.g., Cooper et al., 2007; Kingsbury et al., 2013), whilst room for general improvement exists. For example, Leone et al. (2001) commented on the inadequacy of a 4-point scale for psychometrically reliable results, Heym et al. (2008) pointed out the possible need for revision with additional items, and there have been calls to consider and take into account the age of the subjects (e.g., Blair et al., 2004; Muris et al., 2005) and the cultural contexts of the studies (e.g., Leone et al., 2001).

2.3. BIS/BAS in previous research

Various lines of research have focused on comparing results obtained with the BIS/BAS Scales with those obtained with other psychometric measurements, including, for instance, the Gray–Wilson Personality Questionnaire (e.g. Knyazev et al., 2004), Cloninger’s Temperament and Character Inventory (TCI) (Mardaga & Hansenne, 2007), and Eysenck’s PEN (Psychotism, Extraversion, Neuroticism) (e.g., Bjørnebekk, 2009; Blair et al., 2004; Heym et al., 2008; Muris et al., 2005). Bjørnebekk (2009) proposed an alternative division of BAS into BAS Drive (BAS D) and BAS Pleasurable Affect (BAS P). Within this division, he defined BAS Drive as persistency in the pursuit of goals, whether these were inherently pleasurable or not, and BAS P as sensitivity to potential pleasure, a desire for rewards, proclivity to experience positive affect with regard to rewards, and a tendency to seek out potential rewards. However, Bjørnebekk and Diseth (2010) discarded this division and returned to the basic solution of BIS and one BAS.

Torrubia and his colleagues (2001) created the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ), to assess the functioning of BIS/BAS.

According to them, both BIS and BAS should be considered in a twofold manner. They defined BIS both as passive avoidance, or withdrawal from situations involving the possibility of failure and other aversive consequences, and as the emotional/cognitive responses experienced in these situations, for example worry, anxiety or fear. BAS was described as an approach tendency, or responsiveness to stimuli associated with primary rewards, and as active avoidance, or behaviour that reduces the likelihood of punishment (see also Wilson, Barret & Gray, 1989). In the SPRSQ, the BAS item content has been created with reference to specific rewards (for example, money, sex, social power and approval, and praising), so as to avoid ambiguity in the interpretation of the questions. The BIS items were constructed with the intention to measure both behavioural inhibition (passive avoidance) and the emotional or cognitive processes produced in response to perceived threats of punishment or failure.

Mardaga and Hansenne (2007) examined links between BIS/BAS and the temperament dimensions of Cloninger's TCI. Of these, harm-avoidance (HA), novelty seeking (NS), RD (reward dependence) and Ps (persistence) are particularly relevant to this study. HA is defined as being responsible for inhibition and NS as activation of behaviour. RD, the tendency for a positive response to reward, maintains behaviour. Ps maintains behaviour in cases where perseverance is exhibited despite frustration and fatigue. Mardaga and Hansenne's results showed HA and RD as predicting BIS, and NS and Ps as predicting BAS. Whilst responsiveness to reward in the Carver and White (1994) division is included in BAS, Mardaga and Hansenne conclude that the responsiveness to social rewards aspect of RD corresponds to BIS as measured by the BIS/BAS Scales, citing as an example the item "*Criticism or scolding hurts me quite a bit*" loading on RD.

The BIS/BAS conceptualization has been tested in various cultural settings (e.g. Bjørnebekk, 2007, 2009; Bjørnebekk & Diseth, 2010; Knyazev et al., 2004; Leone et al., 2001), as well as with different age groups: pre-school children (e.g. Blair et al., 2004), early adolescents (e.g. Bjørnebekk, 2007, 2009; Bjørnebekk & Diseth, 2010; Cooper et al., 2006; Knyazev et al., 2004), and adults of different ages (e.g. Heubeck, Wilkinson & Cologon, 1998; Jorm et al., 1997). Attention has also been paid to how BIS/BAS relates to the general approach-achievement division (e.g. Elliot & McGregor, 2001; Elliot & Thrash, 2002). However, whilst achievement goal

conceptualizations also include an approach–avoidance distinction (e.g., Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001, Thrash & Elliot, 2001; Niemivirta, 2002), empirical research investigating the connections between the two is relatively sparse in comparison to the wide range of BIS/BAS research.

2.4. BIS/BAS in this study

The instrument used in this study is the largely explorative Niemivirta (2007) Motivation and Sensitivity to Reward and Punishment (MSRP) questionnaire, which utilised the Torrubia et al. (2001) SPSRQ and Cloninger's Temperament and Character Inventory (TCI, cf. Mardaga & Hansenne, 2007; cf. Pelissolo, Mallet, Baleyte, Michel, Cloninger, Allilaire and Jouvent, 2005) as well as the work of Colder and O'Connor (2004), with the theoretical aspects of Carver and White's (1994) research, including the three-fold division of BAS, as a background framework. The aim was a pragmatic one: to create an instrument for measuring BIS/BAS in a way that corresponds to the interests of motivation research. The instrument uses the BIS/BAS division, without the inclusion of a separate FFFS scale. Based on the theories behind the above-mentioned scales, BIS was defined as inhibition or shyness, fear of failure, discomfort, and withdrawal, experienced when faced with unknown people and novel situations. BAS was considered as divided into three subcategories: interpersonal responsiveness as sensitivity to social rewards; impulsivity, with a preference for swift results and feedback and tasks quickly completed; and the tendency to experience as well as to express delight at novel situations and personal successes, which could be considered as also including sensitivity to anticipate potential new rewards. The categories were named BAS Inter, BAS Impulse, and BAS Intra, respectively.

3. Achievement goal orientations

3.1. Conceptualizations and divisions of achievement goals

A traditional division within research into personal goals has described two fairly generalized types of goals: learning, or mastery, goals on the one hand, performance goals on the other (for an overview, see Thrash & Elliot, 2001). As the labels would suggest, for students with mastery goals, the focus is on understanding, gaining knowledge and improving their skills, whereas performance goals describe a focus on demonstrating abilities and not exposing inabilities, and where success and skills are

evaluated in relation to those of others (Ames, 1992; Dweck, 1986; Dweck & Leggett, 1988; Elliot & McGregor, 2001; Nicholls, 1984; Niemivirta, 2002; Ryan, Pintrich & Midgley, 2001). In addition to mastery and performance goals, Nicholls and his colleagues (Nicholls, 1984; Nicholls, Pataschnik & Nolen, 1985) identified also work avoidance, which refers to an indifferent, passive stance towards schoolwork, and a tendency to refrain from exerting effort on it.

The ways students define ability and the demonstration of competence have been seen as a key issue in understanding and describing different types of achievement-related behaviour (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984; Nicholls et al., 1985). These definitions can be done in relation to oneself, whereby mastering a task judged difficult implies ability and demonstrates competence, or according to normative criteria through comparison and in relation to others. These have been defined, respectively, as task involvement and ego or social involvement by Nicholls (1984), and as learning goals and performance goals by Dweck (1986).

In the latter case, where ability is judged not as the improvement of one's own skills and mastery, but in comparison to the performance and ability of others, competence cannot be demonstrated through gaining skills and mastering something difficult (Dweck, 1986; Nicholls, 1984; Nicholls et al., 1985). Instead, normative criteria emerge: to show one is competent, one must achieve and demonstrate higher ability than is the average, or the norm, in one's reference group, either by exerting less effort and achieving equal results, or by means of equal effort resulting in higher results. These interpersonal criteria for demonstrating ability and competence can lead to the adoption of goals whereby one will rather demonstrate exerting low effort than exerting effort and failing; in effect, giving up learning so as to avoid public failure, which Nicholls et al. (1986) defined as the avoidance of work goal (see also Dweck, 1986; Nicholls, 1984; Rhodewalt, 1994).

Central to Dweck's (1986) theorising is also the concept of intelligence beliefs, whereby intelligence can be seen as malleable (possible to increase through effort) or fixed (a static ability, as an inherent quality of a person). The combinations of achievement goals (mastery and performance) and these intelligence beliefs create adaptive and maladaptive patterns in achievement behaviour. The maladaptive patterns

are characterised by performance goals (focusing on demonstrating ability and avoiding demonstrating failure) combined with the belief of intelligence as a fixed ability. This combination would lead to seeing exerting effort in learning and mastery as carrying the danger of failing and, consequently, being exposed as incompetent, leading to setting personal goals at a lower level of difficulty (see also Rhodewalt, 1994).

Performance-oriented children have been found to have a tendency for negative affect, negative self-cognitions when confronting obstacles, and low persistence in the face of difficulty (Dweck, 1986; Dweck & Leggett, 1988). Mastery-oriented children, characterised also by the belief in the possibility of increasing one's ability through effort, display an opposite pattern of behaviours and affect, as well as persistence when faced with difficult tasks – in other words, an adaptive pattern of achievement behaviour. It is to be noted that these patterns are not related to intellectual potential as evidenced by IQ-tests, grades, or achievement test scores; in fact, according to Dweck (1986), actual competence – or the potential for it – does not predict achievement level. Past successes and high achievement do not suffice to create confidence in future success, either, especially as the level of difficulty of schoolwork increases. The consequences of maladaptive behavioural patterns may become obvious and detrimental only in the later school years, as the avoidance of challenging tasks has accumulated into a deficiency of skills.

Work avoidance is not included in Elliot and Harackiewicz's (1996) postulated conception of three goal structures. Instead, it comprises of one mastery-oriented and two performance-oriented (approach and avoidance) goals. The mastery and performance-approach goals are seen to share a tendency to approach potential positive outcomes (task mastery in the case of mastery goals, normative competence in the case of performance approach). Performance avoidance is here defined as being related to focusing on potential negative outcomes and, consequently, on avoiding failure and incompetence. The main difference between the two approach-related and the performance-avoidant goal structures is suggested to be the quality of the motivation: mastery and performance-approach goals support intrinsic motivation, whereas performance-avoidance goals decrease it (Elliot & Harackiewicz, 1996).

This view of the performance-related goals has not been shared across the board. According to Covington (2000), the focus of both kinds of performance-oriented students is on potential failures and fears of incompetency (see also Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984; Nicholls et al., 1985). Performance-approach directs attention to avoiding failure through succeeding, and performance-avoidance describes an attitude of, instead of the avoidance of failure, rather ensuring that failures are such that they do not imply a lack of competence (see also Covington & Müeller, 2001). This view is in line with the importance the demonstration of competence and ability holds in Nicholls' (1984) thinking, whereby normative criteria (personal competence and ability defined through rating it against that of others) hinders aiming for the goal of task mastery.

A division of achievement goals known as the 2 x 2 framework (Elliot & McGregor, 2001; Thrash & Elliot, 2001) is widely used in today's research into achievement goals (e.g., Bjørnebekk & Diseth, 2010; Tanaka & Yamauchi, 2004). This framework is conceptually based on both an approach-avoidance distinction of either seeking the desirable outcome of reward, or avoiding the undesirable outcome of punishment, and a mastery-performance distinction, which refers to the definitions of competence employed by an individual (see Nicholls, 1984). Drawing on these two constructs, they postulated a four-way division of goal types, namely, mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. The division of goals is classified based on both an individual's definition of competence, as well as the valence of competence (Elliot & McGregor, 2001).

Within this framework, definitions of competence are divided according to three standards: the absolute standard related to the requirements of the task; the intrapersonal standard focusing on one's own past level or maximum potential achievement, and the normative standard dealing with performance relative to others (Thrash & Elliot, 2001). The valence of competence can be positive or negative. Accordingly, mastery-approach describes the focus on mastering, gaining competence or improving at a given task (intrapersonal definition, positive valence), and mastery-avoidance the focus on avoiding task-based incompetence or the losing of skills one has already acquired (absolute definition, negative valence). Performance-approach refers to the goal of normative competence, i.e. performing successfully (normative

standard, positive valence), and performance-avoidance to the goal of avoiding normative incompetence or a poor performance (normative standard, negative valence) (Thrash & Elliot, 2001; Elliot & McGregor, 2001; Elliot & Murayama, 2008).

3.2. Achievement goal orientations

The concept of achievement goal orientations refers to an individual's tendency to select and favour certain goals and end results, which, in turn, depicts their generalised attitudes towards school-related learning and achievement (Niemivirta, 2002). These generalised attitudes tend to remain similar and relatively stable both over time and from one learning context to another, reflecting a motivational mindset and suggesting that there are dispositional factors behind the various achievement goal orientations (Niemivirta, 2002; Tapola & Niemivirta, 2008; Tuominen-Soini, Salmela-Aro & Niemivirta, 2011; Tuominen-Soini, Salmela-Aro & Niemivirta, 2012). Achievement goal orientations are the other major concept the present study focuses on.

Drawing on and conceptually resembling a number of theories within motivation and achievement-goal research (e.g., Nicholls, 1984; Nicholls et al., 1985; Dweck, 1986; Grant & Dweck, 2003), achievement goal orientations in this framework are divided into a five-fold model of achievement goal orientations (Niemivirta, 2002). This model distinguishes two mastery orientations (intrinsic and extrinsic), two performance orientations (approach and avoidance), and an avoidance orientation. The validity of the achievement goal orientation framework has been tested and verified in numerous empirical studies (e.g., Niemivirta, 2002; Pulkka & Niemivirta, 2013; Tapola, Jaakkola & Niemivirta, 2013; Tuominen-Soini, Salmela-Aro & Niemivirta 2008; Tuominen-Soini et al., 2011, 2012).

In the achievement goal framework (Niemivirta, 2002), the mastery-intrinsic (formerly learning) orientation describes the goal of learning and mastering a subject area for intrapersonal reasons, for the desire to learn; this is comparable to the task-involvement definition of Nicholls (1984) and Nicholls et al. (1985). Also the mastery-approach goal construct (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Thrash & Elliot, 2001) and the mastery-intrinsic orientation resemble each other, in how the standard of achievement is conceptualised. Both are defined as having the focus on the task and mastering it, as well as reaching an intrapersonal standard, without comparison to the

skills, achievement or ability of others. The mastery-extrinsic (formerly performance) orientation (Niemivirta, 2002) includes as a central aim alongside learning also a demand for absolute performance in the form of achieving good grades, which resembles the outcome goals defined by Grant and Dweck (2003). However, whilst the mastery-extrinsic orientation and the mastery-avoidance goals (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Thrash & Elliot, 2001) share the intrapersonal aspect of focusing on one's own performance and the absolute standard aimed at, there is a distinction between the two constructs. The latter is defined through the fear of losing skills, and the former, if defined by fear as such at all, would be more focused on the fear of not reaching the absolute standard set by oneself.

Within the Niemivirta (2002) framework, the focus of the performance-approach orientation is on normative, relative success; in other words, the goal is to outperform others. This is in line with Nicholls' (1984) and Nicholls' his colleagues' (1985) definition of ego and social involvement, and with the performance-approach goal, where the standards of achievement are set in a normative way, pitting one's own performance against that of others. However, the performance-avoidance goal (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Thrash & Elliot, 2001) and the performance-avoidance orientation (Niemivirta, 2002) again differ from each other in a fundamental way. Whereas the performance-avoidance goal is defined as aiming to avoid performing poorly, the performance avoidance orientation sees the focus as a straightforward avoidance of evaluative situations where failure is possible (Niemivirta, 2002). Thus the fear of failure has a more central role in the definition of the performance-avoidance orientation.

Finally, the avoidance orientation (Niemivirta, 2002) refers to a disinterest in exerting effort on schoolwork, and in effect, aiming to work as little as possible. The avoidance orientation does not correspond to the Elliot and Thrash (2001) and Elliot and McGregor (2001) 2 x 2 framework, whereas it does reflect the avoidance of work/academic alienation goal postulated by Nicholls et al. (1985). Elliot and McGregor state that a work avoidance goal should not be considered a goal at all. In the light of the definition of goals as objects, events or experiences sought (Niemivirta, 2002), this claim seems reasonable. Instead, Elliot and McGregor consider work avoidance as an objective adopted in an achievement setting when no goal is pertinent.

However, the definition of the avoidance orientation is in keeping with the definition of achievement goal orientations as the tendency to select and favour not only goals but also end results, depicting generalised attitudes regarding achievement (Niemivirta, 2002). Consequently, the inclusion of the avoidance orientation within the spectrum of achievement goal orientations is warranted, particularly as it has been observed in numerous empirical studies (e.g., Niemivirta, 2002; Pulkka & Niemivirta, 2013; Tapola & Niemivirta, 2008; Tuominen-Soini et al., 2008; Tuominen-Soini et al., 2012).

Previous research has examined the relationships between achievement goal orientations and various other phenomena, for example, students' perceptions of and preferences for classroom environments (Tapola & Niemivirta, 2008), subjective well-being (Tuominen-Soini et al., 2008), academic well-being (Tuominen-Soini et al., 2012), and students' evaluations of the learning environment (Pulkka & Niemivirta, 2013), as well as comparatively between different cultural contexts (Niemivirta, 2001). A relatively recent development in this line of research has been to utilise the person-centred (or person-oriented) approach (e.g., Tuominen-Soini et al., 2008, 2012). Following this approach, it is assumed the participants forming a sample are not a homogenous entity, but rather, that distinct subgroups, each exhibiting tendencies and combinations of tendencies typical to them, can be observed (Bergman & Andersson, 2010; Bergman & Trost, 2006). Individuals are seen in a holistic way as "*a dynamic system of interwoven components*" (Bergman & Andersson, 2010, 155), and the factors – in this case, the achievement goal orientations – as an interactive configuration, rather than as single factors. Tuominen-Soini et al. observed six profiles in their 2008 study, namely indifferent, mastery-oriented, success-oriented, performance-oriented, disengaged, and avoidance-oriented students, and four (indifferent, mastery-oriented, success-oriented, and avoidance-oriented) in their 2012 research, with each profile exhibiting different emphases on the five achievement goal orientations. These profiles have uncovered combinations of orientations; for instance, students described by the performance-oriented profile scored relatively high on both performance-approach and performance-avoidance orientations, but also on the avoidance orientation (Tuominen-Soini et al., 2008).

3.3. Effects of BIS/BAS on achievement goals in previous research

A personality type more weighted on the BAS tendency of reacting has been found to be a positive predictor of mastery goals and performance approach goals, and BIS of performance avoidance goals (Bjørnebekk, 2007; Bjørnebekk and Diseth, 2010; Elliot & Thrash, 2002). However, also BIS has been observed to have relations with performance approach (Bjørnebekk, 2007; Bjørnebekk & Diseth, 2010). Both of these dissimilar tendencies predicting performance approach goals may, in part, be due to the combinations of differing levels of BIS and BAS in individuals (see e.g. Corr & McNaughton, 2008). However, this serves as an example of how also social and/or situational factors are likely to be at work (see e.g. Tapola, 2013, for analyses of situational factors in this context). The social environment has an effect on the way individuals learn to handle, manage and cope with their temperamental dispositions and the affects related to learning situations that dispositional factors may typically bring about (Covington, 2000; Elliot & Thrash, 2002; see also Ryan, Pintrich & Midgley, 2001). The influence of the environment in shaping an individual's personality more generally is not denied in today's disposition-focused BIS/BAS-research either (see e.g. McNaughton & Corr, 2008). In fact, interest in the interaction of situational and dispositional factors is becoming increasingly central in the study of motivation (see e.g., Tapola, 2013; Urdan & Schoenfelder, 2006), and the biologically inherent, dispositional nature of BIS/BAS should not be viewed as predetermining an individual's goal adoption and related learning achievements (Elliot & Thrash, 2002). However, as this study focuses on the way disposition affects achievement goal orientations, situational factors will here be left unexamined.

According to Elliot and McGregor (2001), the results obtained using the instrument they devised show a pattern of correlations between the achievement goals they suggest, in that each goal construct correlates positively with those constructs with which it shares a competence dimension (i.e., whether competence is defined as mastering a subject or as performance), and not with others. Heimpel, Elliot and Wood (2006), using a two-factored solution of BIS/BAS, discovered a positive effect of BIS, and a negative effect of BAS on avoidance (relative to approach) goals; self-esteem was established as a mediator between both the relations. However, the results of Tanaka and Yamauchi (2004), Bjørnebekk (2007, 2009) and Bjørnebekk and Diseth (2010) have not been as straightforward.

Tanaka and Yamauchi (2004) factored the results of their BIS/BAS measurements together with other phenomena, to form constructs of which two, the inhibitory tendency (which encompasses but is not limited to BIS) and the individualistic tendencies (likewise encompassing but not limited to BAS) are relevant to this study. Their results indicated that their inhibitory-tendency construct, comprising of sensitivity to rejection, fear of failure and BIS, significantly predicted the mastery-avoidance goals formulated by Elliot and McGregor (2001). Those high in both inhibitory and individualistic tendencies, a construct they formulated consisting of individualism, independent self-construal, competitiveness and BAS, were found to be more likely to adopt performance-avoidance goals, although the effect in both relations were small. Tanaka and Yamauchi also reported that those high in the BAS-related individualistic tendencies were more likely to adopt performance-approach goals, which, however, were also predicted by their BIS-related inhibitory-tendency construct, although they state the effect was marginal. The only correlation Tanaka and Yamauchi observed between BIS/BAS as defined by Carver and White (1994) and the achievement goals as defined by Elliot and McGregor, was, contrary to the theoretical framework, between BAS and performance avoidance goals.

Using the Achievement Motive Scale created by Gjesme and Nygård, based on the work of McClelland and Atkinson (cf. Bjørnebekk, 2007, 2009), Bjørnebekk (2007, 2009) investigated the hypothesised links between the motivational constructs Motive to Succeed (M_s) and Motive to Avoid Failure (M_f), the 2 x 2 achievement goal orientation division (Elliot & McGregor, 2001), and both a two-factor BIS/BAS solution and a solution with BIS, BAS P and BAS D. The results supported the hypothesis of relations between BIS and M_f , and between BAS and M_s , but against his hypothesis, a significant positive effect of also BIS on M_s was discovered. His overall model of BIS/BAS and M_s and M_f gave a significant effect on all four achievement goals. Against his hypotheses were the significant effects obtained for the BAS/ M_s construct on performance avoidance, and between M_s and mastery avoidance. Related to this, Bjørnebekk (2009) found positive correlations between not only BAS but also BIS and M_s , as well as between both BIS and BAS and M_f , although the relationship between the latter was smaller, and the correlation between BAS and M_f was only observed between BAS D and M_f .

Bjørnebekk and Diseth (2010) factored BIS/BAS with extraversion, neuroticism, positive affect and negative affect, to create two factors: the approach temperament and the avoidance temperament. Their results were in accordance with the hypothesised relations between the approach temperament and the mastery and performance-approach goals, and between the avoidance temperament and mastery and performance-avoidance goals, as measured with the Elliot and McGregor (2001). However, they also discovered a significant path between the avoidance temperament and performance-approach goals. They saw this as supporting the idea of performance-approach goals being also motivated by a tendency to avoid punishment or negative affect. Also paths from the approach temperament to avoidance goals were found, which they stated were more difficult to interpret. Overall, they found their results to support the 2 x 2 framework (Elliot & McGregor, 2001; Elliot & Thrash, 2002).

4. The research hypothesis and task

The hypothesis in this study is that the neurobiologically based BIS/BAS tendencies (Corr, 2008) have an effect on students' achievement goal orientations, also considered to be relatively stable aspects of their personality (Niemi-virta, 2002), and exhibited, in the case of this study, in relation to their schoolwork. The measured effects of BIS/BAS on achievement goal orientations will be examined and discussed.

The other research task of this study is to examine how the MSRP (Niemi-virta, 2007) succeeds in defining and measuring aspects of BIS/BAS. Comparisons with results obtained with other instruments will be made. Possibilities for improving the present instrument will be discussed

5. Method

Participants

The sample consisted of 78 students (49 boys, 29 girls) aged 14 to 15, from five classes in a school in the metropolitan area of Helsinki. The surveys were administered by one of the creators of the instrument. Participation was voluntary, and the students were assured of the confidentiality of their replies. The surveys were conducted during school hours.

Measurements

The students completed a self-report questionnaire, which comprised of scales for measuring BIS/BAS characteristics and achievement goal orientations. Questions regarding their experiences of and preferences for classroom practices, as well as sections measuring self-worth contingency and fear of failure, were also included in the same questionnaire. This study only utilised the sections on BIS/BAS and achievement goal orientations.

Measuring BIS/BAS was conducted using the MSRP (Niemivirta, 2007), described in Chapter 2.4. The scales comprised of six questions measuring BIS and eight measuring BAS. The items were developed with a view to covering aspects of both reactions (behaviour) and emotional responses to stimuli and situations (see Torrubia et al., 2001). The six BIS items were constructed so as to assess inhibition experienced in new situations, when faced with public exposure (exemplified by answering in class), and in the company of unknown people, as well as sensitivity to failure. The BAS items measured the three aspects postulated by the theoretical framework: sensitivity to rewards of a social nature (3 items), impulsivity (3 items), and sensitivity to an intrapersonal reward (2 items), which describes a tendency of readily experiencing and expressing excitement and delight in novel situations and at personal successes. In this study, the BAS subdivisions have been labelled BAS Inter, BAS Impulse, and BAS Intra, respectively. The students responded on a scale of 1 (“not at all true [of me]”) to 7 (“completely true [of me]”).

Achievement goal orientations were measured using the achievement goal orientation scales developed by Niemivirta (2002). The five theoretically predicted orientations – the mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, and avoidance orientations – were each measured with three questions. The items measuring the mastery-intrinsic orientation reflect the students’ focus on learning and gaining knowledge as the central goal in their schoolwork. The mastery-extrinsic orientation scale includes items to measure, in addition to the goal of learning, also the aim for successful performance defined in an absolute rather than relative way, in the form of attaining good grades. The items for measuring the performance-approach orientation depict the goal of relative success – of outperforming other students. The

scale measuring the performance-avoidance orientation comprises of items regarding the goal of avoiding situations where failure is perceived possible. Finally, items in the avoidance orientation scale measure the students' aim of exerting as little effort on schoolwork as possible. As above, the scale ranged from 1("not at all true [of me]") to 7 ("completely true [of me]").

Analyses

Based on the theoretical background (Carver & White, 1994; Corr, 2008; McNaughton & Corr, 2008; Elliot & Thrash, 2002), the BIS/BAS characteristics were deemed to be more deep-rooted within the human psychology, and were hence considered the independent variables affecting the individuals' achievement goal orientations. Preliminary analyses consisted of exploratory factor analyses performed to confirm the construct validity of the both the BIS/BAS and the achievement goal orientation measurements. Based on these, composite scores were formed to create a BIS variable, three BAS variables, and a variable for each of the five achievement goal orientations, and their internal consistency was evaluated by calculating their Cronbach's alpha values. The correlations between the BIS/BAS and the achievement goal orientations variables were examined. Finally, regression analyses were performed to analyse the effect of BIS/BAS on the achievement goal orientations. All analyses were conducted using SPSS 22.

6. Results

6.1. Preliminary analyses

Before proceeding to further analyses, the descriptive statistics of the data was examined. All variables were found to be normally distributed to an acceptable level. Two items within the mastery-extrinsic orientation construct were found to exhibit some skewness and kurtosis ("*It is important to me to get good grades*", skewness -1.22, kurtosis 2.28; "*My goal is to do well in tests and assignments*", skewness -1.20, kurtosis 1.66). This was reflected in the composite scores later constructed for the factors. The mastery-extrinsic orientation was found to have the skewness value of -1.29 and the kurtosis value of 2.14. However, this was considered acceptable, especially given the small sample size. A slightly larger sample size would perhaps levelled out these values. The division between the number of girls and boys in the

sample ($N=78$, $n_g=29$, $n_b=49$) did not enable examining the data with gender as an independent variable.

To examine the construct validity of the measurement, and thereby establish the postulated BIS/BAS dimensions as separate and definable, an exploratory factor analysis was performed using Principal Axis Factoring with Promax rotation. The communalities ranged between .310 and .719. No items were removed from analysis at this stage, as values above .2 are considered adequate. The number of factors to retain was determined using eigenvalues (greater than 1) and the scree test as criteria. The analysis showed four factors with eigenvalues greater than one (3.18, 2.82, 1.61, and 1.35, respectively). The first factor corresponded to BAS Inter (22.7% of the variance), the second to BIS (20.2% of the variance), the third to BAS Impulse (11.5% of the variance), and the fourth to BAS Intra (9.7% of the variance). The four-factor solution was supported also by the scree test. Based on this, four factors accounting for 64.1% of the total variance were extracted (see Table 1 for all BIS/BAS items and factor loadings).

Some items were discovered to load onto two factors. The item *“I like to do things or have assignments where I can get a reward or feedback quickly”* cross-loaded onto BAS Impulse (.71) and BAS Inter (.31), the item *“I express my excitement and enjoyment openly, when I succeed or am praised”* onto BAS Intra (.45) and onto BAS Inter (.40), and the item *“I am easily upset if I am criticized or told off”* onto both BIS (.60) and BAS Intra (.39). In these three cases, the items loaded onto the expected factor with a higher value, and were therefore included in the composite score for that construct.

Table 1. Factor loadings of the BIS/BAS items.

Scale item	Factor			
	1	2	3	4
BAS Inter				
I often try to impress my classmates or the teacher.	.74			
I enjoy being the centre of attention.	.70			
<i>I avoid talking or performing in public (e.g. answering in class). (BIS)</i>	-.54	.34	.30	
I often do things just to be praised (e.g. by the teacher).	.49			
BIS				
I feel very uncomfortable in new situations and places.		.77		-.30
I am easily shy in the company of people I don't know and in new situations.		.62		
I am easily upset if I am criticised or told off.		.60		.39
I often leave things undone just because I fear I will fail.		.50		
BAS Impulse				
I sometimes act hastily just to get a reward or positive feedback.			.72	
I like to do things or have assignments where I can get a reward or feedback quickly.	.31		.71	
It is important for me to complete things and assignments quickly.			.54	
<i>I withdraw easily in difficult or awkward situations. (BIS)</i>		.47	.54	
BAS Intra				
I find being in new situations exciting.				.72
I express my excitement and enjoyment openly, when I succeed or am praised.	.40			.45

Note: Items not included in composite scores are given in italics, and the expected factors in brackets.

Table 2. Factor loadings of the achievement goal orientation items

Scale item	Factor				
	1	2	3	4	5
Mastery Extrinsic					
It is important to me to get good grades	.99				
My goal is to do well in tests and assignments.	.88				
One of my important goals is to do well at school.	.81				
<i>Learning new things is my most important goal at school. (Mastery Intrinsic)</i>	.52			.35	
<i>I am very pleased if I succeed in showing the other students that I am capable. (Performance Approach)</i>					
Avoidance					
I try to get assignments done with as little work as possible.		.90			
I try to do only the compulsory assignments and nothing more.		.73			
I am not interested in doing anything extra towards my schoolwork.		.72			
Performance Approach					
One of my important goals at school is to do better than other students.			.91		
It is important to me to get better grades than many other students.			.77		
<i>It is important to me that I don't fail in front of other students. (Performance Avoidance)</i>			.49		
Mastery Intrinsic					
One of my important goals at school is to learn as much as possible.				.92	
One of my important goals at school is to gain new knowledge.				.70	
Performance Avoidance					
I try to avoid those situations at school where I might appear incapable or stupid.					.84
I try to avoid situations where I might fail or make mistakes.					.62

Note: The items not included in composite scores are given in italics, and the expected factors in brackets.

Two items cross-loaded with a higher value onto factors they were not intended to measure. As this indicated that they did not, in this sample, measure the phenomena with satisfactory accuracy, the items were not included in the composite scores and were left out of further analyses altogether. The item *“I avoid talking or performing in public (e.g., answering in class)”*, originally intended as measuring BIS, had a low loading on the BIS factor (.34), and loaded also onto the BAS Impulse (.30) and the BAS Inter factors (-.54). The item *“I withdraw easily in difficult or awkward situations”* loaded with a lower value onto the intended BIS factor (.47) than onto BAS Impulse (.54). Possible reasons for the unexpected loadings are considered in Chapter 7.2.

The same procedure was followed with the items used to measure achievement goal orientations. Construct validity was examined by conducting an exploratory factor analysis using Principle Axis Factoring with Promax rotation. Communalities ranged between .345 and .863. Four factors with an eigenvalue greater than 1 were observed. However, as the instrument has been successfully used in previous studies with a five-factor solution (see e.g., Niemivirta, 2002; Tapola et al., 2013), as the fifth eigenvalue was close to 1 (.876), and as the scree test supported a five-factor solution, five factors accounting for 75.7% of the total variance were extracted. The factors corresponded to the mastery extrinsic, avoidance, performance approach, mastery intrinsic, and performance avoidance orientations, explaining 38.4%, 14.4%, 8.8%, 8.2%, and 5.8% of the variance, respectively (see Table 2 for a full list of items and their factor loadings).

In this measurement, there were three problematic item loadings. The item *“One of my important goals at school is to learn as much as possible”* cross-loaded onto both the intended factor Mastery Intrinsic (.35) and onto Mastery Extrinsic (.52). The performance-avoidance item *“It is important to me that I don’t fail in front of other students”* loaded onto the Performance Approach factor. The Performance Approach item *“I am very pleased if I succeed in showing the other students that I am capable”* did not load onto any factor. As the validity of the instrument used here has been tested in previous research, as discussed in Chapter 3.2., it is likely the small sample size in the present study was the reason behind the unexpected loadings, and that a larger sample would even this out. Here, all three items were excluded from further analyses.

Table 4. Correlations between the BIS/BAS and achievement goal orientation variables

	1	2	3	4	5	6	7	8	9
BIS	1								
BAS Inter	.14	1							
BAS Impulse	.17	<u>.24</u>	1						
BAS Intra	-.02	.40	.07	1					
Mastery Intrinsic	.02	.04	-.35	<u>.24</u>	1				
Mastery Extrinsic	.01	<i>.19</i>	<u>-.25</u>	<u>.27</u>	.58	1			
Performance Approach	.13	.41	.02	.12	<u>.24</u>	.45	1		
Performance Avoidance	.43	.09	<i>.21</i>	-.01	.12	.22	<u>.27</u>	1	
Avoidance	.18	.00	.34	-.31	-.45	-.37	-.16	.02	1

Note: Correlations at the $\leq .01$ level are given in bold, at the $\leq .05$ level underlined, and those approaching significance at $< .10$ in italics.

Composite scores for the four BIS/BAS factors and five achievement goal orientations were constructed, using the items with satisfactory loadings. The means, standard deviations and Cronbach's alphas are shown in Table 3.

Table 3. Descriptive statistics and Cronbach's alphas for all composite scores

Variable (N of items)	M	SD	α
BIS (4)	3.00	1.12	.66
BAS Inter (3)	3.34	1.21	.71
BAS Impulse (3)	3.80	1.18	.66
BAS Intra (2)	4.33	1.09	.64
Mastery Intrinsic (2)	4.71	1.39	.81
Mastery Extrinsic (3)	5.68	1.22	.91
Performance Approach (2)	3.31	1.75	.80
Performance Avoidance (2)	3.97	1.37	.67
Avoidance (3)	4.66	1.44	.83

6.2. Correlations

Once the composite scores for all variables had been constructed, their correlations were analysed. All correlations are shown in Table 4. There was a statistically significant correlation between the BAS Inter and BAS Impulse constructs ($r = .24$) and the BAS Inter and BAS Intra constructs ($r = .40$). BAS Inter correlated with Performance Approach ($r = .41$). BAS Impulse correlated negatively with Mastery Intrinsic ($r = -.35$) and Mastery Extrinsic ($r = -.25$), as well as positively with Avoidance ($r = .34$). BAS Intra correlated positively with both Mastery Intrinsic and Mastery Extrinsic ($r = .24$ and $r = .27$, respectively), and negatively with Avoidance ($r = -.31$). The BIS construct correlated with only one other variable, namely Performance Avoidance ($r = .43$).

Mastery Intrinsic and Mastery Extrinsic correlated statistically significantly ($r = .58$), as did Mastery Intrinsic and Performance Approach ($r = .45$). Performance Approach correlated also with Performance Avoidance ($r = .27$). The Avoidance orientation correlated negatively with both Mastery Intrinsic ($r = -.45$) and Mastery Extrinsic ($r = -.37$). The correlation between Mastery Extrinsic and Performance Approach approached statistical significance ($r = .22$, $p = .054$).

Table 5. Regression of achievement goal orientations on BIS/BAS

	BIS			BAS Inter			BAS Impulse			BAS Intra		
	Beta	<i>t</i>	Sig.	Beta	<i>t</i>	Sig.	Beta	<i>t</i>	Sig.	Beta	<i>t</i>	Sig.
Mastery Intrinsic	.09	.85	.40	.01	.11	.91	-.39	-3.53	.00	.26	2.28	.03
Mastery Extrinsic	.05	.45	.66	.18	1.45	.15	-.32	-2.85	.00	.22	1.87	.07
Performance Approach	.08	.75	.46	.43	3.60	.00	-.10	-.87	.39	-.04	-.35	.73
Performance Avoidance	.41	3.84	.00	.00	-.00	.99	.17	1.25	.22	-.01	-.11	.91
Avoidance	.10	.95	.35	.09	.77	.44	.33	3.11	.00	-.36	-3.25	.00

+

6.3. Regression analyses

Once it was established that there were significant correlations between the BIS/BAS characteristics and the achievement goal orientations, a series of regression analyses, where the achievement goal orientations were run on the BIS/BAS variables, was conducted, to investigate their relationships further. The complete results of the analyses are shown in Table 5. All effects reported here were large according to the Cohen's (1988) δ standard of .8.

Of the variation of the mastery-intrinsic orientation, the model explained 19.9% ($F=4.540, p=.002$). The variation was predicted negatively by BAS Impulse, ($\beta=-.39$), and positively by BAS Intra ($\beta=.27$). Of the variation of the mastery-extrinsic orientation, the model explained 17.2% ($F=3.782, p=.008$). The variation was predicted negatively by BAS Impulse ($\beta=-.37$). The effect of BAS Intra on the variation of the mastery-extrinsic orientation approached statistical significance ($\beta=.22, t=1.867, p=.066$).

Of the variation of the performance-approach orientation, the model explained 17.9% ($F=3.969, p=.006$). The orientation was predicted only by BAS Inter ($\beta=.43$). Regarding the variation of the performance-avoidance orientation, of the 20.6% ($F=4.725, p=.002$) explained by the model, the effect was caused only by BIS ($\beta=.41$). Finally, of the variation within the avoidance orientation, the model explained 24.5% ($F=5.913, p<.001$). BAS Impulse predicted avoidance orientation positively ($\beta=.33$), and BAS Intra negatively ($\beta=-.36$).

6.4. The MSRP instrument

Due to the MSRP instrument being relatively new and not, as yet, used in published research, a comparison of the interrelationships of the BIS/BAS factors extracted here will be compared with those obtained with other instruments used in previous research, including some studies that have not focused on the effects of BIS/BAS on achievement goal orientations. As regards the correlations between BIS and the BAS constructs, there is a marked difference between this study and previous research. In this study, BIS was not found to correlate with any of the three BAS factors, whereas Kingsbury et al. (2013) found it to correlate with BAS RR, Bjørnebekk (2007) with BAS, and Bjørnebekk (2009) with BAS D and BAS Pleasurable Affect. Heym et al.

(2008) used a two-factor BIS-Anxiety and FFFS-Fear, which both correlated with two BAS constructs: BIS-Anxiety positively with BAS RR, negatively with BAS FS, and FFFS-Fear negatively with both BAS D and BAS FS.

The correlations between the three BAS factors in this study were to some extent in line with those measured in previous research. In this study, BAS Inter correlated with BAS Impulse and with BAS Intra; in Kingsbury et al.'s (2013) work, there was a similar correlation between BAS RR and BAS FS, and between BAS RR and BAS D. Neither study found a correlation between the other BAS constructs, namely BAS Impulse and BAS Intra or BAS FS and BAS D, respectively. Heym et al. (2008), however, found correlations between all three BAS constructs, BAS RR, BAS F and BAS D.

Overall, the instrument proved to function relatively well. The items measuring the intended subdivisions of BAS as defined by the theoretical framework behind the instrument loaded mostly onto distinct factors, implying that they described the constructs adequately. The factor loadings show a consistent pattern, in spite of the unexpected loadings presented above, and whilst the Cronbach's alpha values are not high, they exceed the .60 limit considered acceptable.

7. Discussion

The purpose of this study was to examine how the latent BIS/BAS factors predicted students' achievement goal orientations. A distinct and theoretically meaningful pattern of predictions was observed. The study also examined the way the MSRP instrument (Niemivirta, 2007) captures the aspects of BIS/BAS it was intended to measure. Despite some problematic item loadings, the instrument produced factors that corresponded well to the background theory, and it was hence found to be a promising start towards developing alternative scales for measuring BIS/BAS. The results are in support of the research hypothesis that achievement goal orientations have a dispositional basis and that consequently, their innate sensitivities make students more likely to choose certain goals as opposed to others in learning and performance situations.

7.1. Effects of BIS/BAS on achievement goal orientations

To test the hypothesis of BIS/BAS exerting an effect on achievement goal orientations, a series of regression analyses was conducted. The mastery intrinsic and mastery extrinsic orientations were found to be predicted negatively by BAS Impulse, and mastery intrinsic orientation also positively by BAS Intra, where the effect on the mastery-extrinsic orientation was only slightly below statistical significance. The performance-approach orientation was predicted by BAS Inter, and the performance-avoidance orientation by BIS. Finally, the avoidance orientation was predicted positively by BAS Impulse, and negatively by BAS Intra.

The close relation between the mastery-intrinsic and mastery-extrinsic orientations is evidenced by both being predicted negatively by BAS Impulse. This suggests that a low tendency for impulsivity, i.e. the preference for swift feedback and “getting things done quickly” (see Chapter 2.4.), is related to an inherent sensitivity for task-involvement (Nicholls, 1984) and a choice of learning and mastery goals (Dweck, 1986; Elliot & McGregor, 2008; Elliot & Thrash, 2002; Thrash & Elliot, 2001) in a learning and performance environment. This could be seen as some students being dispositionally advantaged towards adaptive patterns and, accordingly, towards performing well in a school setting (see e.g., Dweck, 1986; Dweck & Leggett, 1988).

The two mastery orientations differ in how the standard of competence is set: students with a mastery-intrinsic orientation as defined by Niemivirta (2002) evaluate competence according to a subjective, and the mastery-extrinsic according to an absolute standard. The mastery-intrinsic orientation was also more clearly positively predicted by BAS Intra, which describes a certain inherent openness, excitement and enthusiasm towards embracing new challenges. This suggests a possibility of some innate difference in the setting of subjective or absolute standards of competence evaluation, although the difference in effect was small and may have been evened out by a larger sample. However, the effect of this sensitivity on mastery orientations is in keeping with, for example, Dweck (1986), who stated that students with mastery-oriented patterns enjoy new challenges and – understandably – show persistence also in the case of obstacles and difficulties. Dweck suggests a relationship between various educational practices and mastery goals with their adaptive patterns. These are likely to affect self-evaluative means and hence, goal setting, but it would appear that some

students are already some way ahead of others in their enjoyment of learning, by virtue of their innate sensitivity to approach with a positive outlook the opportunity to engage in new and challenging learning situations.

The performance-approach orientation, defined by setting goals based on normative standards and performance relative to others (Niemivirta, 2002), was predicted by BAS Inter, which depicts a dispositional responsiveness towards interpersonal rewards in the form of social acceptance and attention, as previously discussed in Chapter 2.4. The effect indicates that there exists an inherent sensitivity to experience and interpret one's environment through, and consequently to seek, an externally based positive evaluation of oneself also with regard to academic achievement (see Tapola, 2013). This sensitivity predisposes an individual to goals where competence is experienced when displayed to and approved by others (see also Dweck, 1986; Nicholls, 1984).

The performance-avoidance orientation is the only construct in this study found to be predicted by, or indeed even to correlate with BIS. BIS, as stated previously in this study (see Chapter 2.1), is defined as sensitivity to perceive and react strongly to stimuli indicating painful, frustrating, non-rewarding and/or undesirable experiences and outcomes of activity, and a self-protective function against such experiences (Carver & White, 1994; Corr, 2008; Corr & McNaughton, 2008; Elliot & Thrash, 2002). Students exhibiting a performance-avoidance orientation aim to shy away from learning or performance situations where they feel they may fail and/or be exposed as “dumb” or incompetent (Niemivirta, 2002). This result offers further support to considering the avoidance of evaluative learning or performance situations as having a dispositional basis (Elliot & Thrash, 2002).

The result is, to an extent, also in line with Bjørnebekk (2007), who found a significant effect for BIS on the performance-avoidance goal. However, Bjørnebekk and Diseth (2010) observed a link also between BIS and performance-approach goals. It is worthwhile noting that whilst BIS, in accordance with the theory, can sensitise an individual to maladaptive processes potentially detrimental to learning, such as a focus on failures and mistakes, it is not seen to hinder a mastery-oriented approach to learning and performance situations either. For example, Bjørnebekk's (2009) result of BIS being positively related to M_s would suggest this to some extent. Biological factors

such as BIS/BAS sensitivities do not predetermine an individual's behaviour, which is also affected by environmental factors, for example personal experiences and learnt coping strategies (see Elliot & Thrash, 2002).

The avoidance orientation was predicted by the same BAS factors as both mastery orientations, BAS Impulse and BAS Intra, but with opposite valences. The disinterest in exerting effort on academic pursuit altogether appears here as a separate orientation in its own right, related, according to the results of the present study, to an impulsive rather than the inhibitory/anxious BIS tendency, combined with low levels of seeking and feeling excited by novel challenges set by a learning and performance environment. This suggests that not all avoidance in school settings is related to inhibition and/or fear of failure, and supports the inclusion of avoidance orientation in an achievement goal orientation framework (see Niemivirta, 2002; Tuominen-Soini et al., 2008). The impulsive tendency of being sensitive to immediate rewards would appear to be in contrast with the longer-term effort required by schoolwork. Situational factors and previous experience may further emphasise the tendency to feel disinterested. If immediate rewards sought are not forthcoming, and instead, the impulsive tendency perhaps producing repeated experiences of failure, students with this sensitivity may conclude their abilities are low, and accept this state of affairs (see Nicholls, 1984).

This result also offers an alternative explanation to the results obtained by Bjørnebekk & Diseth (2010), who, against their hypotheses, observed paths from approach temperament (in their study, a latent construct encompassing but not limited to BAS) to avoidance goals. They suggested this may have been due to the measurement being taken before a particular achievement situation, leading them to hypothesise that high levels of approach temperament could lead to anxiety before an achievement situation. Without taking a stand for or against this hypothesis, in the light of the present results it appears the approach temperament–avoidance goal relationship could to some extent also be explained by utilising the framework here employed, and the avoidance orientation as defined by it, given its relations with BAS Impulse.

7.2. Evaluation of the MSRP instrument

Some items on the instrument were found to cross-load onto two or three factors. These cross-loadings may be explained by, on the one hand, the wordings of the items, which might have left too much room for ambiguity in interpretation. On the other hand, it seems reasonable to take into account also the intercorrelations observed between the BAS factors. Also, it is worth noting that Corr and McNaughton (2008, 168) state that even the more easily separable BIS, FFFS and BAS systems, due to their interaction, are not independent of each other in the way they elicit behavioural effects, and that, therefore, the *“assessment of underlying personality factors will involve variables that are likely not to be factorially pure.”* This would indicate that since the subsystems of BAS are by definition close to each other, as they share the same conceptual basis of the approach tendency (see e.g., Carver & White, 1994; Mardaga & Hansenne, 2007), the likelihood of cross-loadings is greater, and should perhaps consequently be considered with some lenience. However, it is naturally worthwhile analyzing the possible reasons behind the cross-loadings, to evaluate whether some rewording would improve the accuracy of the instrument in measuring the intended construct.

The item *“I like to do things or have assignments where I can get a reward or feedback quickly”*, intended as measuring BAS Impulse, loaded also onto BAS Inter. BAS Impulse is intended to cover the impulsivity tendency; however, some students may have focused on the word “reward”, which points directly at the definition of BAS Inter (sensitivity to rewards of a social nature). BAS Impulse and BAS Inter also correlate statistically significantly with each other (see Table 4), so some cross-loadings may be inevitable due to the closeness of the constructs and their behavioural effects. It might nevertheless be worthwhile to reword the item, or perhaps separate it into two items, one dealing purely with reward, the other with quick feedback.

As intended, the item *“I express my excitement and enjoyment openly, when I succeed or am praised”* loaded onto BAS Intra, but also onto BAS Inter. A significant correlation was observed also between these two constructs (see Table 4), which may have played a part. However, the wording of the item is likely to have had an effect, the

desire to be praised being closely related to the sensitivity for social acceptance and rewards (BAS Inter), and excitement at success as being characteristic of a tendency to react positively to intrapersonal rewards (BAS Intra). As the instrument only has two items measuring BAS Intra, rewording this item to more unambiguously reflect this construct should be attempted. Simply leaving out the aspect of praise might be enough to even out the cross-loading to a more acceptable level. Similarly, an item such as, for example, *“I enjoy being praised publicly”* might be a useful addition for measuring BAS Inter.

Interestingly, the item *“I am easily hurt if I am criticized or told off”* loaded on both BIS and BAS Intra. This holds special interest in the sense that there was no correlation observed between the two constructs, and no cause related to the wording of the item is immediately obvious. It may be that this is a case where the interaction of a high BIS and a high BAS Intra causes a behavioural effect, in the way suggested by the joint subsystems hypothesis (Corr, 2002; Corr & McNaughton, 2008). It is also possible that both BIS (the fear of failure, a tendency towards inhibition) and BAS Intra could be activated by similar stimuli. In the case of BAS Intra, the valence of the response would be the opposite of the positively-valenced sensitivity for and tendency of experiencing and readily exhibiting excitement and delight at novel situations and personal successes. Conceivably, criticism and being told off could feel particularly hurtful for someone with these sensitivities. This suggestion would, to some extent, be supported by the correlation observed by Bjørnebekk (2009) between BIS and BAS P (sensitivity to signals of pleasure, and associated positive affect), which could be considered comparable to BAS Intra.

The item *“I avoid talking or performing in public (e.g. answering in class)”*, originally intended as a BIS item, had a low loading on the BIS factor, loaded also on the BAS Impulse factor, and negatively, with the highest loading, on the BAS Inter factor. No immediate wording-related cause is evident, apart perhaps from the negative BAS Inter loading, where it could be considered a reverse-scored item for enjoying attention. It is possible that asking students to evaluate what they prefer to avoid doing may be an unnecessarily complicated way of wording the question. It might be better to simplify the phrasing, for example, *“I don’t like to talk publicly (e.g., answer in class), if I can*

help it”, which would also take into account the fact that avoiding answering is perhaps not always possible in all classes and with all teachers.

The intended BIS item *“I withdraw easily in difficult or awkward situations”* loaded onto both the BIS factor and onto BAS Impulse. This might at least in part be caused by the wording, in several ways: “withdraw” could be an unfamiliar word for the age group; also, a literal interpretation of the word would equal physically withdrawing from classroom situations by leaving the class, which is not possible for students. This latter interpretation would perhaps have made the research subjects less likely to choose a higher value in reply to the question. Another reason might be that the focus of some students when replying has not been on the withdrawing from a socially threatening (“difficult and awkward”) situation, or ones that carry a perceived threat of a fear of failure, but on another interpretation of the adjectives. As discussed previously (see Chapter 2.4.), BAS Impulse describes an impulsive tendency with a desire to attain immediate rewards and complete tasks swiftly. Situations and/or tasks described as “difficult” or “awkward” might, in the light of this sensitivity, be interpreted as meaning that they take a long time and sustained effort to get through and to complete; this could explain the cross-loading. The item should perhaps be separated into two, one focusing on time-consuming tasks/situations requiring sustained effort, and the other on the withdrawing from situations that arouse the fear of failure, or feel socially threatening.

Overall, the results obtained using the MSRP instrument are in keeping with the theoretical framework, and are hence straightforwardly explicable within it. In this, they compare well with the results of previous research conducted with different instruments, where the observed effects and intercorrelations have sometimes appeared more difficult to explain, and have on occasion been stated as being against the hypotheses based on the background theories they utilised (Bjørnebekk, 2009; Bjørnebekk & Diseth, 2010; Tanaka & Yamauchi, 2004). In light of this, it seems reasonable to suggest that the instrument is a welcome step towards developing an alternative to the widely employed Carver and White (1994) BIS/BAS Scales. The results also further support the division of achievement goal orientations as defined by the theoretical framework (Niemivirta, 2002) used in this study, as the orientations were predicted by biological sensitivities corresponding to their respective definitions.

7.3. Limitations of this study and suggestions for future research

The sample size ($N=78$) in the present study is small for making generalisations, and did not allow the use of more refined analytical methods such as structural equation modelling. Furthermore, the data was collected from one school in a socio-economically homogenous neighbourhood in the capital city area. This further reduces the generalisability of the results. As the data used was cross-sectional, the causal relationships remain unclear. The results obtained, and the study itself, should therefore perhaps be considered preliminary, and more as giving pointers towards future research.

The instrument is in its testing phase, and whilst, as discussed above, it appears to reflect the phenomena according to the theorization reasonably well, the factor loadings were not always as intended. Consequently, some variables consisted of only two items. Further development of the instrument, including refining the items found problematic in this study and the creation of additional items, is likely to improve its validity and accuracy.

Developing the instrument could, in itself, be considered a topic for future research. Further research into the background theories, and subsequently developing the instrument to reflect the revised RST and including items to measure FFFS, could be another possibility. However, even with its limitations, the study offered interesting insights into the effects of BIS/BAS on achievement goal orientations, and future work on similar lines and the instruments used here seems potentially fruitful. Combining longitudinal and cross-sectional studies, with larger sample sizes, would enable uncovering the relationships of the phenomena more reliably. Also the effects of BIS/BAS on the perception of situational factors and classroom preferences, and the combined effects of these on students' achievement goal orientations, could be considered (see e.g., Tapola, 2008). According to Urdan and Schoenfelder (2006), there is often greater difference observed within classes than between them in students' perceptions of classroom environments, practices and atmosphere, which suggests an effect of dispositional factors (see Tapola, 2013). Another possible line of future research could take also the students' academic performance into account, to see whether and how it might be connected to the BIS/BAS tendencies as defined by the framework used in this study.

The measurements are taken in a school context, as academic goal setting has generally been the focus of achievement goal orientation research (e.g., Pulkka & Niemivirta, 2013; Tapola et al., 2013). While BIS/BAS is, as a dispositional system, considered to be stable across situations (Corr, 2008), it would also be of interest to see whether the same patterns of predictions can be observed in the context of other goal-oriented activities, such as sports, music, or other hobbies. These might, for instance, have less structured lesson plans, evaluations, and testing, might require less long-term sustained effort before a reward (or the experience of being rewarded), and could be self-chosen. These situational factors, among others, could conceivably affect the participants' experiences, in line with their dispositional tendencies, in a way that would be visible in their achievement goal orientations within these contexts.

An intriguing line for future research would be the possibility of adopting a person-oriented approach (Bergman & Andersson, 2010; Bergman & Trost, 2006) into the effects of BIS/BAS on academic goal setting. Both BIS/BAS and the achievement goal orientations have been shown to be dispositional or disposition-related, and hence stable or fairly stable (Corr, 2008; Corr & McNaughton, 2008; Elliot & Thrash, 2002; Niemivirta, 2002; Tuominen-Soini et al., 2008, 2011, 2012). Connections between them have been established within different theoretical settings and using different methods and instruments (e.g., Bjørnebekk, 2007, 2009; Bjørnebekk & Diseth, 2010). They would consequently qualify, according to the criteria considered central to the theoretical aspect of the person-oriented approach, as parts of a whole that are "*inextricably interwoven and believed to interact*" (Bergman & Trost, 2006, 604), and which evolve as a system over a developmental time scale.

Achievement goal orientation profiles have previously been studied in a variety of settings (e.g., Tuominen-Soini et al., 2008, 2011, 2012; Pulkka & Niemivirta, 2013). BIS/BAS research using the person-oriented approach has previously been conducted by, for example, Coplan et al.'s (2006) work on BIS/BAS and the socio-emotional functioning of children, and the more neurochemically focused study of Blair et al. (2004). Both of these studies, however, have used the reduced dimensions of a two-factor model, i.e. merely BIS and BAS. Adopting a person-centred approach and profiling BIS/BAS using a more nuanced division, and examining the predictive

relationships of the obtained profiles with regard to achievement goal orientations, might prove useful in understanding both the mechanisms and processes relating to BIS/BAS, as well as the ways they affect the goal-setting of students.

8. Conclusions

The relationships between BIS/BAS and achievement goals have been addressed in previous research. However, to my knowledge, the relations between achievement goal orientations and BIS/BAS have not yet been examined; also, the MSRP instrument employed here has not been used in published research. The MSRP was found to work in a satisfactory way. The results obtained were in keeping with the theoretical framework the study was based on, and revealed a meaningful pattern of effects. Therefore, the results of this study can be said to offer some new insights into the effects of BIS/BAS on achievement goal orientations. The results also suggest pointers for future research, and indicate that continued research within this framework, with further development and use of the instrument, would be a worthwhile addition to the investigation into the relations of BIS/BAS and achievement goal orientations.

The results are in line with research that postulates that achievement goals and goal orientations have a dispositional basis (Bjørnebekk, 2007, 2009; Elliot & Thrash, 2002; Niemivirta, 2002; Tapola, 2013; Thrash & Elliot, 2001; Tuominen-Soini et al., 2008, 2011, 2012). The biological BIS/BAS tendencies, with their sensitivities for particular and characteristic kinds of rewards and each contributing to a typical way of perceiving and reacting to the environment, were reflected in the patterns of defining competence, the types of rewards sought, and the characteristic reactions to learning and achievement situations associated with a given achievement goal orientation. The results supported the distinction between the performance-avoidance and avoidance orientations made in the Niemivirta (2002) framework. The biological tendency for anxiety, with a sensitivity to perceive threats and self-protect against these through avoidant reactions, was related to the performance-avoidance orientation, which is defined by fear of failure in an achievement setting, and the avoidance of performing publicly. An impulsive sensitivity to immediate rewards, combined with low experience of positive affect with relation to novel situations and personal successes, was seen to predict the avoidance orientation, which depicts a lack of interest in

exerting effort on schoolwork. This would indicate the two orientations have quite different biological bases.

The observed results highlight the importance of taking into account the individuality of students, with their different, inherent sensitivities and needs, within a school environment. Biological sensitivities, whilst they cannot be said to predetermine behaviour or achievement goal orientations (Elliot & Thrash, 2002), do mediate the way students experience and approach learning and performance situations (McNaughton & Corr, 2008). It is likely fruitless to attempt to change individuals with different dispositions to better suit a given system of educational practices, or to find a single educational solution to suit all students (Tapola, 2013). To support and meet the needs of students of all dispositions requires developing methods that take into account and allow for their individual differences.

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